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UNITED STATES PATENT APPLICATION FOR GRANT OF LETTERS PATENT

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PAY-OUT TUBE

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PAY-OUT TUBE

FIELD OF INVENTION

The present invention relates to a pay-out tube used in conjunction with cable boxes and containers for facilitating the feeding of cable, wire and other flexible rope-like materials from such boxes and containers.

BACKGROUND OF THE INVENTION

It is customary in the manufacturing and preparation for shipment and subsequent handling of cable to wind the cable using an overlapping figure 8 pattern which results in a radial opening through the completely-formed cable winding. The figure 8 winding procedure provides for the end of the cable disposed interiorly of the winding to be directed from inside the winding through the radial opening formed in the winding and dispensed from the winding in a generally smooth process which provides the cable in a fashion easily presentable for installation to the appointed situation.

To facilitate storage, shipping, and handling, such windings are typically housed within a cardboard or similar container which has an opening formed in one wall. The winding is placed in the container in an orientation where the axis of the radial opening intersects the opening in the wall of the container and is generally perpendicular to the wall containing the opening. The pay out end of the cable is directed out the opening in the container wall thus providing for dispensing the cable.

The pay-out tube is generally inserted radially into the radial opening of the winding itself in order to tend to prevent the opening from collapsing during handling and storage and as the cable is progressively dispensed. The pay-out tube is also coupled to the container so as to be generally perpendicular to the wall of the container in which the opening is located and fully

engaged, fastened to, and coaxial with said opening in the container wall. With this arrangement, the interior end of the cable can be threaded through the pay-out tube, entering the tube at the end interior to the winding and being pulled through the outside end of the tube and out of the container. The tube functions as a guide that facilitates the uncoiling of the cable loops so that the cable may be dispensed in a fashion ready for application.

Pay-out tubes are commonly used in the cable industry. For a basic understanding of the state-of-the-art with respect to pay-out tubes one is referred to the following U.S. Patents Nos.: 4,022,300; 4,047,203; 4,274,607; 5,042,739; 5,064,136; 5,150,852; 5,115,995; 5,152,476; 4,373,687; and, 5,368,245.

Known pay-out tube designs have various drawbacks and disadvantages. First, many pay-out tubes are difficult to install and attach to the container opening. Second, many conventional pay-out tubes provide no means of retaining and holding the terminal end of the cable once pulled from the winding, and they thus allow the terminal end of the cable to hang free and uncontrolled such that often the terminal end of the cable inadvertently retracts within the winding in the container requiring a difficult procedure to extract it. Third, conventional pay-out tubes have a tendency to become crushed or distorted in handling and usage, thereby compromising the uncoiling and dispensing function normally provided. Fourth, although the figure 8 winding pattern is designed to reduce the tendency for pigtailing during the dispensing operation, cable variations that may occur during manufacturing, occasional winding irregularities that may occur in the production of the winding, and winding shifts that may occur during storage and handling sometimes result in failures to fully uncoil during the dispensing operation, resulting in an interruption of the process of dispensing the cable by pigtailing and/or in the development of damaging kinks in the cable.

Therefore, there is and continues to be a need for a cable container pay-out tube that is easy to install, provides an convenient and reliable means of retaining the terminal end of the cable, and facilitates a smooth and obstruction-free cable dispensing operation.

SUMMARY OF THE INVENTION

The present invention relates to a pay-out tube that is utilized within a cable container for directing cable from the container, through the pay-out tube and out the container. The pay-out tube includes a molded tube portion having a surrounding wall that includes a series of spaced-apart ribs integrally molded into the wall and extending from the wall such that the thickness of the individual ribs exceeds the thickness of the wall.

In a particular embodiment of the present invention, the pay-out tube includes a generally elliptically-shaped tube having a major axis, a minor axis, an outlet end portion and an inlet end portion. The spaced-apart reinforcing ribs are integrally formed in the inlet end portion of the tube and generally aligned with the major and minor axises of the tube. In one particular design, each rib assumes a longitudinal configuration and projects towards the outlet end portion of the tube.

The present invention further comprises a pay-out tube for use in conjunction with a cable container that includes a cable retainer adapted to be disposed exteriorally of the cable container for receiving an end portion of the cable housed within the cable container and retaining the same. The cable retainer includes a surface or plate divided by one or more slits that form at least two sections with at least one of the two sections being deflectable and which deflects at least partially open in response to the end of the cable being inserted between the sections.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of the pay-out tube.

FIG. 2 is a side elevation view of the tube portion of the pay-out tube.

FIG. 3 is an inlet-end plan view of the tube portion.

FIG. 4 is a perspective view of the tube.

FIG 5 is a sectional view of the tube taken through line 5-5 of FIG. 4.

FIG. 6 is a sectional view of the pay-out tube shown assembled with a container.

FIG. 7 is an outlet-end plan view of an alternative design of the collar for the pay-out tube.

FIG. 8 is an enlarged perspective view illustrating the cable or wire retainer shown in FIG. 7.

DETAILED DESCRIPTION OF THE INVENTION

With further reference to the figures, and in particular **FIG. 1**, the pay-out tube is indicated generally by the numeral **10**. Pay-out tube **10** is basically of a two-piece construction and includes a tube indicated generally by the numeral **20** and a collar indicated generally by the numeral **12**.

Turning to tube **20**, the same is comprised of an elongated and tapered tube with a generally elliptical cross sectional wall structure **22**. Tube **20** includes an inlet end portion **24** including an inlet end **25**, an intermediate portion **23**, and an outlet end portion **26** including an outlet end **28**. Tube **20** is tapered from outlet end **28** to inlet end **25** and has a generally elliptical cross section described by a major axis **25a** and a minor axis **25b** as can be seen in **FIG. 3**.

Turning more specifically to a description inlet end portion **24** of the tube **20**, in addition to the elliptical shape of the cross section there exist four ribs **29a, 29b**, **29c**, and **29d**. Each rib is reverse tapered relative to the taper of tube **20**, and each rib extends from inlet end portion **24** to intermediate portion **23**. Ribs **29a** and **29b** are circumferentially centered on major axis **29a** and ribs **29c** and **29d** are similarly centered on minor axis **25b** as can be seen in **FIG. 3**. The circumferential width of ribs **29c** and **29d** is somewhat greater than that of ribs **29a** and **29b**. Referring more specifically to the taper of the ribs, the circumferential width becomes narrower from inlet end portion **24** to intermediate portion **23**. Similarly, the radial thickness of each rib becomes smaller from inlet end portion **24** to intermediate portion **23**. The ribs are formed integrally with wall structure **22** so as to provide increased wall thickness in the areas of the ribs as compared to the remainder the wall structure.

Turning now specifically to outlet end portion **26**, in addition to the generally elliptical cross-section there is disposed somewhat interior to outlet end **26** a flange **27**. The section of outlet end portion **26** disposed between the flange **27** and the outlet end **28** forms an outlet end extension **28a**.

Turning more specifically to flange **27**, the same includes opposed surfaces **27a** and **27b**. Formed immediately adjacent to the wall structure **22** are two openings **27c** and **27d**, which are positioned generally opposite each other and centered on the major axis **25a**. Disposed radially outward, adjacent to openings **27c** and **27d** and on surface **27b** are two latch surfaces **27e** and **27f** **(fig. 3)**.

Turning now to collar **12**, the same is an elliptical torus with a rectangular circumferential cross section and with a surface **11a**, a surface **11b**, and an interior opening **12a**. Disposed

diagonally opposite each other and along major axis **25a** are two latches **40a** and **40b**. Disposed on surface 11a, aligned with the minor axis **25b** is a clip **13**.

Turning more specifically to latches **40a** and **40b** and as seen in Figure 6, the latches are comprised of cantilevers **42a** and **42b** with tabs **42c** and **42d**. Each cantilever **42a** and **42b** is directed generally perpendicularly to surface **11b** and biased slightly outward. Each tab **42c** and **42d** is directed at an angle outwardly and towards surface **11b**.

Turning now specifically to clip **13**, in a preferred embodiment a wire or cable clip **13** is integrally molded into the collar **12**. Due to its construction and relationship to surface **11a**, clip **13** is biased to assume a closed position.

Collar **12** may be provided with an alternative to clip **13**. As seen in **FIG. 7** and **FIG. 8**, disposed on collar **12** is a retainer **60**. Retainer **60** is comprised of a membrane or surface **61** which is preferably molded integrally in, and is disposed in, a region located radially outward on collar **12**. Surface **61** is segmented by slits **62a** and **62b** dividing plate **61** into segments **63a**, **63b**, **63c**, and **63d** which segments are somewhat less stiff than the surrounding region **64**. To retain a cable or wire end within the retainer **60**, an end portion of the cable or wire is inserted between or within one of the slits **62a** and **62b**. As the cable or wire end is pushed through the slit or slits, one or more of the segments or panels **63a, 63b, 63c** and **63d** will flex such that the wire or cable end can be inserted. The cable or wire end is retained by the friction or binding action of the segments or cables **63a, 63b, 63c** and **63d**. It is appreciated that the number of slits and panels may vary.

As shown in figures 7 and 8, the retainer **60** is formed in the surrounding angular ring that forms the collar 12. When the pay-out tube **10** is secured to the container **49** as shown in figure 6, the connection is typically sufficiently loose to enable the cable or wire end extending through

the retainer **60** to be pushed between the inner surface **11b** of the collar **12** and the exterior of the wall of the container **49**.

Turning now to the assembly of tube **20** and collar **12** to form pay-out tube **10**, as seen in **FIG. 6**, tube **20** is positioned within a container **49**. Moreover, also positioned within container **49** is a winding [not shown]. In conventional fashion, tube 20 is further inserted into a radial opening formed in the winding. Outlet extension **28a** is extended through an opening in the wall of the container **49** such that flange **27** rests against the container wall. Collar **12** is positioned over outlet end extension **28a** by aligning latches **40a** and **40b** with openings **27c** and **27d**. Then, movement of collar **12** towards flange **27** results in contact of tabs **42c** and **42d** with the outer edges of openings **27c** and **27d** and subsequent deflection of latches **40a** and **40b** inwardly as tabs **42c** and **42d** pass through openings **27c** and **27d**. Due to the outward bias of cantilevers **42a** and **42b**, as tabs **42c** and **42d** move through openings **27c** and **27d** latches **40a** and **40b** snap outward and tabs **42c** and **42d** lock against surfaces **27e** and **27f**. Payout tube **10** is thus affixed to the wall of container **49** by the resulting clamping of the container wall between collar **12** and flange **27**.

Turning now to the operation of the invention, and referring specifically to **FIG. 6**, it is appreciated that a cable or wire is threaded from a winding within the container 49 into inlet end **25** and through outlet end **28** so that the cable end is disposed outside the container. To retain cable end when not dispensing, the cable end is passed under clip **13** and the cable is held in place by the binding action resulting from the bias of clip **13** towards surface **11a**. In the alternative design, which employs retainer **60**, the cable end is introduced into retainer **60** causing opening of one or more slits **62a** and **62b** due to deflection of one or more segments **63a**,

63b, **63c**, or **63d** and allowing cable end to pass through slits **62a** and **62b**. The cable is held in place by the binding action of one or more segments **63a**, **63b**, **63c**, and **63d** against cable **52**.

Pay-out tube **10** of the present invention can be constructed of molded polymer or any other suitable material. As articulated in the foregoing description, the pay-out tube of the present invention has many advantages over the prior art pay-out tubes in that it is easy to install, provides improved stability of the installation and dispensing operation, and provides means for conveniently affixing the terminal end of the cable when dispensing is not in progress.

The present invention may, of course, be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention. The present embodiments are, therefore, to be considered in all aspects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.